

REMARKS

The Examiner is thanked for the due consideration given the application. This amendment is being filed concurrently with a Request for Continued Examination. A Declaration is appended to this paper.

Claims 1-19, 21-28, 30 and 31 are pending in the application. Claims 30 and 31 have been withdrawn. The claims have been amended to better set forth the invention being claimed.

No new matter is believed to be added to the application by this amendment.

Election/Restriction

In response to newly presented claims 30 and 31, the invention has been restricted into the following groups:

I. Method and apparatus for monitoring of diagnosing a combustion process, including receiving sounds from fluid flow events and operational events.

II. Method for monitoring sounds from a generic appliance that converts energy including specific means to store data of a plurality of operating sequences or comparing time intervals.

Group I is elected with traverse. Claims 1-19 and 21-28 read on elected Group I.

As is set forth in MPEP 803, there are two criteria for a proper requirement for restriction between patentably distinct inventions:

(A) The inventions must be independent or distinct as claimed; **and**

(B) There would be a serious burden on the examiner if restriction is not required.

In this case the technologies of monitoring of diagnosing a combustion process Group I and the method for monitoring sounds from a generic appliance of Group II are so intimately interrelated that no undue burden is placed upon the Examiner to examine all the groups on the merits.

Accordingly, rejoinder and examination of all the claims on the merits is respectfully requested.

Rejections Based on WEST et al.

Claims 1, 4-11, 13-16, 19, 21-24 and 26-28 have been rejected under 35 USC §102(b) as being anticipated by WEST et al. (U.S. Patent 5,120,214). Claims 2, 3, 12, 17, 18 and 25 have been rejected under 35 USC §103(a) as being unpatentable over WEST et al. in view of CARR-BRION (GB 2156520). These rejections are respectfully traversed.

The present invention pertains to a method of monitoring an energy conversion appliance of a kind which involves a combustion process, and a diagnostic tool for an energy conversion appliance of a kind which involves a combustion process. As is set forth in independent claims 1 and 22, for example, a sound receiving transducer receives sound signals associated with **each** of two or more different types of

operational events, a first of which is a combustion event and the other an operation of a mechanical or electro-mechanical device, and that the sounds are then compared with pre-established data.

WEST et al. pertain to an acoustically operated burner control system. The teachings of WEST et al. are directed primarily to the use of an acoustic sensor for continuously controlling the operation of a burner flame to give optimum or near optimum combustion conditions. Thus, (see column 9, line 63 to column 10, line 5 of WEST et al.) the microprocessor is arranged to constantly adjust the air control, fuel control and flue gas control to result in the required combustion conditions. This reflects the statement, at column 8, line 67 to column 9, line 4 of WEST et al., that the invention relates to the discovery that there is a reliable and near linear relationship between the intensity of all high-frequency sounds generated within the envelope of the flame of the burner and optimum combustion conditions.

A particular deficiency of WEST et al. as prior art prejudicial to patentability of the subject invention is that the reference is specific to monitoring the sound generated within a flame. That monitoring is undertaken for the purpose of continuously controlling the quality of the flame, i.e., the relative proportions of air and fuel, in order to achieve an optimum flame quality.

In contrast the present invention is not concerned with the continuous control of flame quality. The present invention is directed more generally to the overall monitoring of the performance of a combustion appliance which includes components of a mechanical or electro-mechanical type. The performance of the appliance, and thus monitoring for any deterioration in performance leading to a need for maintenance operations, involves not only an acceptable (albeit not necessarily optimum) performance of the combustion process and also, importantly, satisfactory performance of associated mechanical and electro-mechanical components.

For that purpose the present invention is directed to monitoring the acoustic signatures of two or more operational events. The present invention is not directed to continuously controlling the flame quality. The only control function disclosed in respect of the present invention is that of an emergency shut-down in the event that the monitoring operation detects a hazardous situation arising.

More specifically, while the disclosure of WEST et al. is concerned with continuous control of flame quality for the purpose of ensuring optimum combustion, the present invention is directed with the longer term monitoring of a plurality of operational events for the purpose of establishing when either routine or non-routine maintenance operations should be undertaken.

That is, in contrast to WEST et al., in the present invention as claimed, the acoustic monitoring fails to result in any actual control of the combustion process (other than shut off in the event of a major malfunction). Instead, the acoustic monitoring is employed primarily to detect any significant fall-off in combustion performance, as well as the performance of other components such as pumps and relays.

At page 5 the Official Action refers to Figure 1 of WEST et al. (reproduced below) and asserts that WEST et al. discloses a sound receiving transducer responsive to a second operational event including operation of a mechanical or electro-mechanical device. The Examiner refers to WEST et al. at Figure 1 reference 101 as being at a position near the flame and from which the sound receiving transducer would receive "other sounds of burner". It is not clear what is meant "other sounds of burner", but what is considered clear is that any sound emitted by a burner is that of combustion and not of a mechanical or electro device.

A corresponding observation applies the Official Action's comments at page 9, lines 1-10 with respect to claim 22.

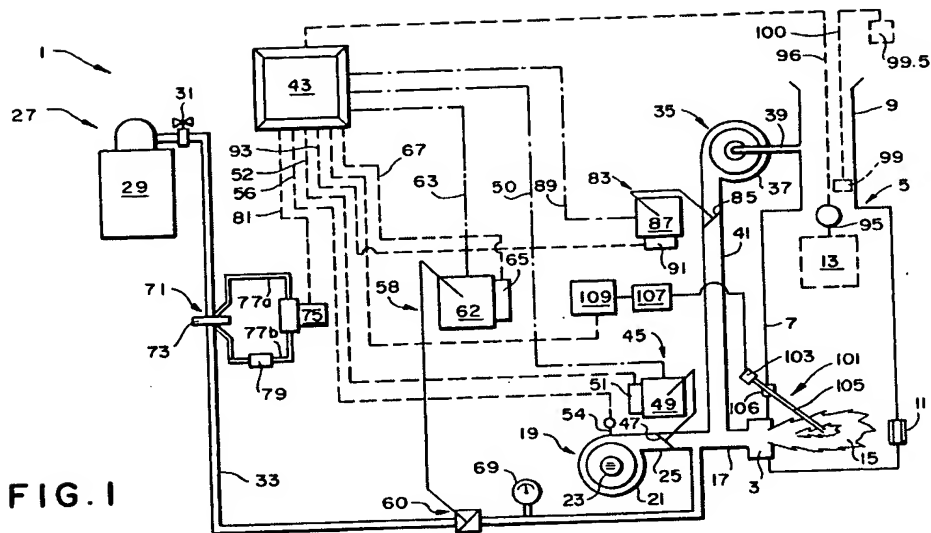


FIG. 1

WEST et al. specifically intends that the acoustic sensor 101 (see Column 8 lines 4 to 28) shall be designed to be sensitive **only** to sounds generated within the envelope of the flame. That is a clear consequence of the requirement that a wave guide 105 is to be provided within WEST et al.'s furnace to transmit sounds from the flame to the microphone, and also that a ring of acoustic dampening material must be provided around the wave guide to minimize any transmission of spurious sounds from the walls of the furnace housing to the wave guide.

Furthermore, the furnace enclosure of WEST et al. is devoid of any mechanical or electro-mechanical components the sounds of which might otherwise be detected by West's acoustic sensor.

In order more clearly to emphasize the distinction between the subject invention and the prior art of WEST et al., the claims are amended to make clear that in addition to receiving

sounds from a combustion source and from a mechanical or electro-mechanical device, it is the sounds from **each** of those sources which are monitored and compared with pre-established data.

Further, the illustration in Figure 1 of WEST et al. is purely schematic and does not as such define the actual position of the different components.

Also, there is no indication that Figure 1 of WEST et al. is to scale. When a reference does not disclose that the drawings are to scale and is silent as to dimensions, arguments based on measurement of the drawing features are of little value. See *Hockerson-Halberstadt, Inc. v. Avia Group Int'l*, 222 F.3d 951, 956, 55 USPQ2d 1487, 1491 (Fed. Cir. 2000).

Additionally, the mechanical and electro-mechanical components of the installation of WEST et al. can be expected to generate a high frequency sound (see the 10 KHz frequency referred to at column 7, line 67 of WEST et al.). If the acoustic sensor were exposed to such sounds additional to that of the burner, the micro processor would not be able to reliably control the combustion conditions. The micro processor would instead seek to control the combustion process in a manner undesirably and erroneously influenced by sounds extraneous to those of the flame.

WEST et al. thus teach away from the present invention.

In the Response to Arguments at page 13 lines 2-4 the Official Action has noted that in response to the previous

Amendment, where it has been stated that the system of WEST et al. would not function properly if additional sounds were present, no evidence has been presented to support that. The accompanying Declaration of Colin Chapman addresses that matter and makes clear that WEST et al. would not function properly if additional sounds were present. See especially Chapman's summary at section 3 at (c) and (e) (i).

The Declaration also makes clear (see section 3 at (d) and (e) (ii)) that because WEST et al. focus on detecting only frequencies greater than 10 KHz, the acoustic sensor provided by West for that purpose would not be appropriate for monitoring of sounds from other sources, and which would have a wider frequency spectrum. Indeed, while WEST et al. contemplate monitoring frequencies in excess of 10 KHz, we see from Column 3 lines 42-47 that preferably the microphone of West is sensitive only to acoustical frequencies greater than 20 KHz and even more preferably only those greater than 30 KHz.

As a result, WEST et al. fail to anticipate independent claims 1 and 22 of the present invention. The teachings of CARR-BRION fail to address the deficiencies of WEST et al., and a *prima facie* case of unpatentability has thus not been made. The Declaration of David Chapman further demonstrates the patentability of the present invention. Claims depending upon claim 1 or 22 are believed to be patentable for at least the above reasons.

These rejections are believed to be overcome, and withdrawal thereof is respectfully requested.


Conclusion

The rejections are believed to have been overcome, obviated or rendered moot, and that no issues remain. The Examiner is accordingly respectfully requested to place the application in condition for allowance and to issue a Notice of Allowability.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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APPENDIX:

The Appendix includes the following item(s):

- Rule 132 Declaration of Colin Chapman